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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MINNE VAN DER VEEN, AWEKE NEGASH LEMMA,  
JAVIER FRANCISCO APREA, and ALPHONS ANTONIUS BRUEKERS

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Appeal 2009-003359  
Application 10/544,203  
Technology Center 2400

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Decided: March 31, 2010

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Before ROBERT E. NAPPI, KENNETH W. HAIRSTON, and JOSEPH F.  
RUGGIERO, *Administrative Patent Judges*.

HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from a final rejection of claims 1 to 12 and 14. Claim 13 has been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We will sustain the non-statutory subject matter rejection, and we will sustain the anticipation rejection.

Appellants' invention relates to a method for adjusting the processing of an information signal using a control parameter which is changed in response to the measured "perceptual quality" of the processed signal (claims 1, 11, and 14; Spec. 1-3). Appellants' claims are directed to a method of processing an information signal (claims 1-10), an arrangement for processing an information signal (claims 11 and 12), and a computer program product comprising computer program instructions embodied on a computer-readable medium for processing an information signal (claim 14).

Claim 14, reproduced below, is representative of the subject matter on appeal:

14. A computer program product for processing an information signal, the computer program product embodied on a computer-readable medium, the computer program product comprising:

computer program instructions for applying a signal modification process to an information signal resulting in a processed signal, said signal modification process being controlled by at least one control parameter;

computer program instructions for comparing the processed signal with the information signal to determine a measure of perceptual quality of the processed signal;

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computer program instructions for adjusting said at least one control parameter in response to the determined measure of perceptual quality.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Watson

US 2004/0024588 A1

Feb. 5, 2004

(i) The Examiner rejected claim 14 under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

(ii) The Examiner rejected claims 1 to 12 and 14 under 35 U.S.C. § 102(e) as being anticipated by Watson.

Appellants present substantive arguments on the merits with regard to independent claims 1, 11, and 14 (Br. 8-11), and separate arguments as to dependent claim 2, 3, and 4 (Br. 12-13). Appellants present nominal arguments with regard to claims 5, 6, 8, 9, and 12, stating that these claims stand or fall with respective independent claims 1 and 11 (*see* Br. 13).

Regarding the non-statutory subject matter rejection of claim 14, Appellants argue (Br. 5-8) that the computer program product of claim 14 is embodied on a computer-readable medium which is described in the Specification as a physical structure such as a processor, computer, or processing system. Appellants contend that the computer program product embodied on a computer-readable medium of claim 14 is not a “signal,” even under the broadest reasonable interpretation (Br. 6-7). The Examiner relies upon paragraph [0062] of United States Patent Application Publication No. US 2006/0140406 to Van Der Veen as supporting the interpretation that

the computer-readable medium can be a signal, since it describes computer-executable instructions being received “from another computer via a computer network” (Ans. 3 (citing Spec. 7:15)). We note that Van Der Deen is the basis for the instant application on appeal, and that paragraph [0062] is identical to the paragraph found at page 7, lines 11 to 17 of the Specification (*see* FF2 *infra*).

Regarding the anticipation rejection of claims 1, 11, and 14, Appellants argue that Watson fails to teach ““comparing the processed signal with the information signal to determine a measure of perceptual quality of the processed signal”” (Br. 8-10). Appellants contend that Watson’s feedback based on distortion is different from claims 1, 11, and 14, which require that feedback occur in response to “a measure of perceptual quality of the processed signal” (Br. 8-11).

Regarding the anticipation rejection of claims 2 and 4, Appellants argue that Watson fails to teach comparing a first segment of the processing signal with a first segment of the information signal as recited in claim 2 (Br. 12-13).

Regarding the anticipation rejection of claim 3, Appellants argue that Watson fails to teach segments, or windows, being “subsequent” to one another, and instead Watson shows overlapping windows or segments (Br. 12). Appellants contend that “Watson’s overlapping window is not occurring subsequent to one another because they are overlapping” (Br. 12).

## ISSUES

(i) Based on Appellants' arguments, the non-statutory subject matter issue before us is: Is claim 14 drawn to non-statutory subject matter?

(ii) Based on Appellants' arguments, the following anticipation issues are before us is:

- (a) Does Watson teach "comparing the processed signal with the information signal to determine a measure of perceptual quality of the processed signal," as recited in claims 1, 11, and 14?
- (b) Does Watson teach comparing "segments," as recited in claims 2 and 4?
- (c) Does Watson teach that a second segment is "subsequent" to a first segment of the information signal, as recited in claim 3?

## FINDINGS OF FACT

1. Appellants' Specification describes "perceptual quality" of a processed signal as follows:

The measure of perceptual quality may include any suitable quantity, parameter, or the like that is indicative of a perceivable change in the information content of the information signal caused by the signal modification process. Examples of such measures include a suitable cost function quantifying the artifacts of the signal processing in question. An example of a method for measuring the perceptual quality of audio signals is

described in Thilo Thiede et al., "PEAQ - The ITU Standard for Objective Measurement of Perceived Quality[.]" J. Audio Eng. Soc., Vol. 48, No. 1/2, 2000.

It is a further advantage of the invention that the automatic control is based on a *perceptual measure*, thereby *taking into account the artifacts of the signal processing that influence the perceptual quality*. Examples of such artifacts include a variation in bandwidth, noise loudness asymmetry, temporal masking behavior, or the like.

Hence, it is an advantage that artifacts may be considered other than those considered by the actual signal processing.

The step of comparing the processed signal with the information signal may comprise one or more processing steps of one or both of the signals, such as filtering steps, signal transformations, e.g.[,] Fourier transformations, decoding steps, etc. Furthermore, *the step of comparing may comprise any suitable processing steps for determining the measure of perceptual quality*.

*The adjusting of the control parameters may comprise any suitable control mechanism, e.g.[,] a control loop comparing the measure of perceptual quality with a corresponding target value and correspondingly adjusting the control parameter, or the like.* The adjustment may comprise an increase of the parameter, a decrease of the parameter, or the adjustment may comprise leaving the parameter unchanged.

Examples of control parameters include the embedding strength of a watermark signal, the embedding frame size in a frame-based embedding process of a watermark signal, a frequency/time

allocation, a parameter controlling the bit allocation of a quantizer in an audio coder, etc.

Spec. 3:6-32 (emphases added).

2. With regard to the computer-readable medium that contains the computer program product and instruction, Appellants disclose the following:

It is noted that the features of the method described above and in the following may be implemented in software and carried out in a *data processing system or other processing means* caused by the execution of computer-executable instructions. The *instructions may be program code means loaded in a memory, such as a RAM, from a storage medium or from another computer via a computer network*. Alternatively, the described features *may be implemented by hardwired circuitry* instead of software or in combination with software.

Spec. 7:11-17 (emphases added).

In addition, Appellants disclose:

The invention can be implemented by means of *hardware* comprising several distinct elements, and by means of a *suitably programmed computer*. In the device claim enumerating several means, several of these means can be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a



combination of these measures cannot be used to advantage.

Spec. 15:3-8 (emphases added).

3. Watson describes a perceptual coding system and an associated method of modifying a signal and adjusting one or more parameters used for coding the signal (Abstract; Figs. 5-8, 15, 16, 24-26, 29, and 30; ¶¶ [0212], [0213], [0215], [0216], and [0225]). Watson describes determining a “distortion measurement” to control adjustment of a perceptual coding parameter (¶¶ [0212], [0213]). “A distortion measurement compares the original input signal with the encoded signal . . . . The distortion measure may be useful to control some of the coding parameters to change the outcome of the rate control process.” (¶ [0212]). Watson defines distortion as “the difference between the coded and original signals” (¶¶ [0127], [0215]). Based on the amount of distortion that exists, and whether or not the amount of distortion is acceptable relative to a perceptual threshold, coefficients are amplified or a coding parameter is adjusted (steps 30, 32, and 34 in Fig. 25 as described in ¶ [0215]; steps 30, 32, and 38 as described in ¶ [0216]).
4. Watson describes signal “windows” 4, 5, and 6 as being made by “decomposing the input signal into one or more components” (¶ [0126]). Watson also determines how much accuracy each of the components or windows needs by comparing processed or coded data with source material or data (Figs. 15, 16) (¶¶ [0126]-[0128], [0142],

[0145], and [0146]). Time-domain samples are “windowed,” i.e., they are “processed using overlapping windows” (§ [0126]).

5. Watson additionally describes a signal delay function (§ [0108]).

## PRINCIPLES OF LAW

### *Computer-Related Non-Statutory Subject Matter*

Section 101 of the Title 35 of the United States Code states:

“Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” 35 U.S.C. § 101 (2002).

“A transitory, propagating signal . . . is not a ‘process, machine, manufacture, or composition of matter.’ Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter.” *In re Nuijten*, 500 F.3d 1346, 1357 (Fed. Cir. 2007) *reh’g en banc denied*, 515 F.3d 1361 (Fed. Cir. 2008), *cert. denied*, 129 S.Ct. 70 (2008).

### *Claim Construction*

Analysis of whether a claim is patentable over the prior art under 35 U.S.C. § 102 begins with a determination of the scope of the claim. We determine the scope of the claims in patent applications not solely on the basis of the claim language, but upon giving claim their broadest reasonable construction in light of the specification as they would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359,

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1364 (Fed. Cir. 2004); *In re Morris*, 127 F.3d 1048, 1053-54 (Fed. Cir. 1997).

### *Anticipation*

Anticipation is established when a single prior art reference discloses expressly or under the principles of inherency each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994). “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc., v. Union Oil Co. of Calif.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

### ANALYSIS

We will sustain the Examiner’s rejection with respect to claim 14 as being drawn to non-statutory subject matter, and we will sustain the Examiner’s anticipation rejection with respect to claims 1 to 12 and 14, for the reasons that follow.

#### THE § 101 REJECTION OF CLAIM 14

Appellants’ claim 14 recites a “computer program product” for processing an information signal, the computer program product being “embodied on a computer-readable medium” and comprising “computer program instructions” for performing the steps of “applying,” “comparing,” and “adjusting” that are found in each of the independent claims (claim 14).

The preamble of claim 14, under the broadest reasonable interpretation in light of the Specification, requires a computer-readable medium. *See Am. Acad. of Sci. Tech Ctr.*, 367 F.3d at 1364.

Appellants' argument (Br. 7-8) that the computer program product of claim 14 includes a computer readable medium that "is a physical structure which provides the functional descriptive material in usable form to permit the functionality to be realized with a computer, for example a processor, computer, or processing system" is not persuasive in light of the broadest reasonable interpretation of the Specification.

Appellants' Specification specifically discloses examples of a computer-readable medium as including a "data processing system," "hardware," "a suitably programmed computer," or a "memory, such as a RAM" (FF 2). Appellants' Specification also discloses three specific examples for embodying the program instructions on the computer-readable medium: "The instructions may be program code means [1] loaded in a memory, such as a RAM, [2] from a storage medium or [3] from another computer via a computer network" (FF2).

Taking the broadest reasonable interpretation, one of ordinary skill in the art reviewing Appellants' claim 14 in light of the Specification would interpret a computer-readable medium to be a signal, since instructions are received "from another computer via a computer network" (specifically, Spec. 7:15 in FF2). Although the Specification does not use the word "signal," one of ordinary skill in the art would understand that instructions sent from another computer and received via a computer network would be

in the form of a signal or carrier wave. A claim directed to a signal (i.e., a computer program product embodied in a signal being sent from another computer via a computer network) does not fit within at least one of the four statutory subject matter categories under 35 U.S.C. § 101. *In re Nuijten*, 500 F.3d 1346, 1357 (Fed. Cir. 2007).

For the foregoing reasons, we find that claim 14 recites non-statutory subject matter and is not directed to an eligible “machine” or “manufacture” under § 101. The Examiner did not reversibly err in rejecting claim 14 as being directed to non-statutory subject matter, and we will sustain the rejection.

#### THE ANTICIPATION REJECTION OF CLAIMS 1 TO 12 AND 14

Turning next to the anticipation rejection based on Watson, we agree with the Examiner’s findings of fact and conclusions with respect to the anticipation rejection of claims 1 to 12 and 14 over Watson (*see* Ans. 3-8, 9-13), and adopt them as our own, along with some amplification of the Examiner’s explanation of the teachings of Watson (*see* FF 3-5).

#### *Claims 1, 5, 6, 8, 9, 11, 12, and 14*

Each of independent claims 1, 11, and 14 on appeal recites “comparing the processed signal with the information signal to determine a measure of perceptual quality of the processed signal.” Appellants’ arguments with regard to each of claims 1, 11, and 14 have a common thread, the assertion that Watson fails to teach measuring perceptual quality (Br. 8-11). Appellants contend that Watson’s feedback based on distortion is different from claims 1, 11, and 14, which require that feedback occur in

response to “a measure of perceptual quality of the processed signal” (Br. 8-11).

Claim terms should be given their broadest reasonable meaning in their ordinary usage as such claim terms would be understood by one skilled in the art by way of definitions and the written description. *Morris*, 127 F.3d at 1053-54. In this case, the recitations in claims 1, 11, and 14 of “a measure of perceptual quality” broadly encompasses Watson’s measure of distortion (*see* FF 3), especially to the extent that the claim term “perceptual quality” is claimed and described by Appellants as being “a perceivable change in the information content of the information signal” (*see* FF 1). A change in the amount of distortion in a signal would be understood by one of ordinary skill in the art to be equivalent to a perceivable change in the information content of the signal, because more distortion in a signal leads to less information content.

In view of the foregoing, Appellants’ arguments that (i) Watson fails to teach measuring perceptual quality, and (ii) Watson’s feedback based on distortion is different from claims 1, 11, and 14, which require that feedback occur in response to “a measure of perceptual quality of the processed signal” are unpersuasive (Br. 8-11). Appellants have not demonstrated any reversible error in the Examiner’s anticipation rejection of claims 1, 11, and 14. Because Appellants have not established error in the Examiner’s rejection of claims 1, 11, and 14 under 35 U.S.C. § 102, we affirm the rejection of these claims, as well as that of claims 5, 6, 8, 9, and 12 not separately argued (*see* Br. 12-13).

*Claims 2 and 4*

We turn next to the anticipation rejection of claim 2, and claim 4 which depends therefrom. Each of these claims recites dividing the information signal into “a sequence of segments” and modifying the “comparing . . .” step of claim 1 to compare a first segment of the processed signal with a first segment of the information signal (claim 2).

We agree with the Examiner (Ans. 11-12) that Watson’s windows are used to break the signal into a plurality of smaller segments, since Watson describes the windows as being created by “decomposing the input signal into one or more components” (*see* FF 4). Because Watson teaches comparing signals (FF 3, 4), and also teaches breaking the signals into windows (FF 4), the comparison of particular windows (i.e., segments) with each other is necessarily present in the signal processing method of Watson.<sup>1</sup>

In light of the foregoing, we are not persuaded by Appellants’ argument (Br. 12) that Watson fails to compare first segments of signals as recited in claims 2 and 4. We are also not persuaded by Appellants’ contention (Br. 12-13) that Watson fails to disclose or suggest the “delayed first segment of the information signal” recited in claim 4, because Watson describes a signal delay function (FF 5) as well as comparison of windows

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<sup>1</sup> To establish inherency, the evidence must make clear that the missing descriptive matter is “necessarily present” in the thing described in the reference. *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999). “Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates.” *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349 (Fed. Cir. 2002).

or segments as discussed *supra*. Appellants do not dispute the Examiner's reliance on Watson as disclosing signal delay.

Accordingly, we find that Watson teaches comparing segments as recited in claims 2 and 4, and we will sustain the Examiner's anticipation rejection of claims 2 and 4.

### *Claim 3*

Turning last to the anticipation rejection of claim 3, we find Appellants' contention (Br. 12) that "subsequent" means "occurring later or after" to be unpersuasive. Claim 3 recites a second segment which is "subsequent to the first segment." Giving the term "subsequent" its broadest reasonable meaning in light of the written description, one of ordinary skill in the art would understand that the recitation in claim 3 of "subsequent" segments broadly encompasses Watson's overlapping segments. *Morris*, 127 F.3d at 1053-54. The term "subsequent" reads on two signal segments or windows that are overlapping, since some of the second signal segment will occur later or after the first signal segment. Neither the Specification nor the language of claim 3 limits the term "subsequent" as meaning occurring after *and not occurring during*. Thus, even if a first and second signal segment of a signal overlaps as in Watson, there is still a portion of the second signal segment that is "subsequent" to the first signal segment.

Appellants admit (Br. 12 ) that Watson's windows overlap. Appellants contention (Br. 12) that Watson's overlapping windows do not occur subsequent to one another is unpersuasive in light of our claim interpretation discussed *supra*.



Accordingly, we find that Watson teaches “subsequent” segments as recited in claim 3, and we will sustain the Examiner’s anticipation rejection of claim 3.

#### SUMMARY

Appellants have not convincingly demonstrated that the Examiner erred in rejecting claim 14 under 35 U.S.C. § 101 as being directed to non-statutory subject matter, or in rejecting claims 1 to 12 and 14 under 35 U.S.C. § 102(e) as being anticipated by Watson. *In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006). For all the foregoing reasons, we will sustain the Examiner’s non-statutory subject matter rejection of claim 14, and we will sustain the anticipation rejection of claims 1 to 12 and 14.

#### CONCLUSIONS

The broadest reasonable interpretation of computer program product claim 14 encompasses a signal, and is therefore directed to non-statutory subject matter.

Watson teaches “comparing the processed signal with the information signal to determine a measure of perceptual quality of the processed signal,” as recited in claims 1, 11, and 14.

Watson teaches comparing “segments,” as recited in claims 2 and 4.

Watson teaches that a second segment is “subsequent” to a first segment of the information signal, as recited in claim 3.

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**ORDER**

The decision of the Examiner to reject claim 14 as being drawn to non-statutory subject matter is affirmed.

The decision of the Examiner to reject claims 1 to 12 and 14 as being anticipated by Watson is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

**AFFIRMED**

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